

Appl. No. 09/600,054
Amdt. Dated 04/13/2005

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Previously Presented) A method of providing a desired set of service policies to each of a plurality of subscribers, said method comprising:
 - identifying a plurality of processing rules which provide a set of service policies desired by each subscriber;
 - configuring an internet service node as an edge device of an access network with said processing rules corresponding to each of said subscribers and with said service policies being controlled from an edge of said access network;
 - receiving data in said internet service node;
 - determining in said internet service node a specific subscriber to whom said received data relates; and
 - applying in said internet service node said plurality of processing rules related to said determined specific subscriber, wherein said applying is performed after said determining.
2. (Previously Presented) A method of providing a desired set of service policies to each of a plurality of subscribers, said method comprising:
 - identifying a plurality of processing rules which provide a set of service policies desired by each subscriber;
 - configuring an internet service node with said processing rules corresponding to each of said subscribers, said internet service node being an edge device;
 - receiving data in said internet service node;
 - determining in said internet service node a specific subscriber to whom said received data relates to; and
 - applying in said internet service node said plurality of processing rules related to said determined specific subscriber.

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3. (Previously Presented) The method of claim 2, wherein said applying of said plurality of processing rules in said internet service node is performed after determining said specific subscriber.

4. (Previously Presented) A method of providing a desired set of service policies to each of a plurality of subscribers, said method comprising:

identifying a plurality of processing rules which provide a set of service policies desired by each subscriber;

configuring an internet service node with said processing rules corresponding to each of said subscribers, said internet service node comprises a plurality of processors;

receiving data in said internet service node;

determining in said internet service node a specific subscriber to whom said received data relates to; and

applying in said internet service node said plurality of processing rules related to said determined specific subscriber, wherein said determining and applying together comprises:

assigning each of said plurality of subscribers to a processor group, each processor group being configured with the processing rules corresponding to assigned subscribers; and

forwarding data related to each subscriber to a corresponding processor group after said determining of specific subscriber.

5. (Original) The method of claim 4, wherein each processor group comprises a plurality of processors.

6. (Original) The method of claim 4, wherein data related to subscribers assigned to said processor group is assigned in a round-robin fashion among said plurality of processors.

7. (Original) The method of claim 4, wherein end systems of said plurality of subscribers generate data using internet protocol (IP).

8. (Original) The method of claim 7, wherein said data comprises ATM cells.

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9. (Original) The method of claim 8, wherein said determining comprises examining data contained in said ATM cells, said determination of specific subscriber being based on the results of said examination and a port on which said ATM cells are received, wherein said port is comprised in said internet service node.

10. (Original) The method of claim 9, wherein said applying comprising:
deciding in said port the specific processor group to which said data is to be forwarded, wherein said specific processor group is decided based on said specific subscriber to whom said received data relates to; and
modifying the header of said cells to indicate said determined processor group such that the cells can be forwarded to an appropriate processor group based on examination of cell header, wherein said appropriate processor group is configured with the processing rules relate to said specific subscriber.

11. (Original) The method of claim 10, wherein said deciding is performed using a content addressable memory (CAM), said CAM containing a plurality of locations, each of said plurality of locations having a mask, a search field and an outfield field, said CAM being designed to receive an input value and compare said input value with data in said search field at bit positions specified by said mask for each of said plurality of locations, said CM being designed to generate as output the data stored in said output field if there is a match with the corresponding location.

12. (Original) The method of claim 11, wherein the data stored in the output field of said CAM identifies an identifier of a processor group either directly or indirectly, and wherein each entry of said mask and search field are implemented to store data identifying a subscriber such that said identifier can be determined using said data stored in said output field.

13. (Original) The method of claim 12, wherein a portion of the header of said ATM cells is replaced with said identifier such that said ATM cells can be assigned to a processor group designed to process data related to said subscriber by examining said header.

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14. (Original) The method of claim 13, wherein said identifier is stored in a virtual path identifier (VPI) or virtual channel identifier (VCI) field of said header.

15. (Original) The method of claim 12, wherein bytes 1, 7, 8, 10, and 13-20 of an IP header are provided as said input to said CAM.

16. (Original) The method of claim 13, wherein a switch fabric forwards said data to said processor group based on an examination of said header of said ATM cells.

17. (Original) The method of claim 13, further comprising:
storing a mapping of virtual path identifier/virtual channel identifier (VPI/VCI) and port number to a connection identifier in a virtual channel (VC) table, wherein each entry of said VC table further indicates whether the VPI/VCI of a received cell needs to be replaced, and
accessing an entry in said VC table corresponding to a received cell comprised in said received data,
wherein said header of said received cell is modified only if the data in said entry indicates that the VPI/VCI field is to be replaced.

18. (Original) The method of claim 17, further comprising:
setting the VCI cells forming said received data to said connection identifier;
generating a processor identifier or a processor group identifier using said output of said CAM; and
setting the VPI of said sequence of cells to said processor identifier or said processor group identifier;
wherein said switch fabric uses said VPI to forward said sequence of cells to one of said processors.

19. (Original) The method of claim 12, further comprising setting said mask of a location to examine at least some of the bit positions corresponding to an IP address, and said search field of said location to a plurality of IP addresses in combination with said mask, wherein at least some of said IP addresses are associated with said subscriber.

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20. (Original) The method of claim 19, wherein each of said IP addresses comprises an IP source address.

21. (Original) The method of claim 19, wherein each of said IP addresses comprises an IP destination address.

22. (Original) The method of claim 19, further comprises:
maintaining an IP table mapping each of said plurality of IP addresses to a processor identifier or a processor group identifier; and
using bits in the masked positions of the IP address of said IP packet and said output of said CAM to retrieve said processor identifier or said processor group identifier,
wherein said sequence of cells are assigned to a processor identified by said processor identifier or said processor group identifier by said processor group identifier.

23. (Original) The method of claim 12, wherein said search field does not contain sufficient number of bits to store data identifying said subscriber, said method further comprising:

storing in a plurality of entries of said CAM data identifying said subscriber, wherein the output of said plurality of entries is examined in determining said processor identifier or processor group identifier.

24. (Original) The method of claim 23, wherein the output of one said plurality of entries is used as an input to another one of said plurality of entries of said CAM, wherein the output of said another of said plurality of entries identifies said processor identifier or processor group identifier.

25. (Original) The method of claim 23, wherein received data related to said subscriber is received using an L2TP tunnel.

26. (Original) The method of claim 25, further comprises:

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providing bytes 1, 7, 8, 10, 13-15, and 17-20 of the IP packet contained in a first cell of said received data as a first input; and

providing bytes 23, 24, and 27-37 of the IP packet contained in said first cell as a second input.

27. (Original) A method of providing a desired set of service policies to each of a plurality of subscribers, said method comprising:

- (a) providing an internet service node (ISN) as an edge router;
- (b) specifying a desired set of service policies for each of said plurality of subscribers;
- (c) translating each of said desired service policies into processing rules, wherein each processing rule comprises a classifier and an associated action, wherein said classifier identifies data flows to which said associated action is to be applied;
- (d) configuring said ISN with said processing rules;
- (e) receiving a plurality of bit groups from a subscriber comprised in said plurality of subscribers;
- (f) generating a plurality of packets from data contained in said plurality of bit groups, wherein each of said plurality of packets can be associated with a data flow generated by an application of said subscriber;
- (g) determining a data flow to which each of said plurality of packets relates to; and
- (h) applying said actions associated with classifiers matching said data flow determined in (g),

whereby each of said plurality of subscribers are provided said corresponding desired set of service policies.

28. (Original) The method of claim 27, wherein end systems of said plurality of subscribers generate data using internet protocol (IP) and (f) comprises generating a plurality of IP packets.

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29. (Original) The method of claim 28, wherein said bit groups comprise ATM cells, and wherein said plurality of packets are generated from said ATM cells.

30. (Original) The method of claim 28, further comprising maintain a state for one of said plurality of service policies, wherein said state enables multiple data flows to be processed to meet the service.

31. (Original) The method of claim 28, further comprising maintaining a state for each of said data flows, wherein the processing rules to be applied to packets of each flow is maintained in said state.

32. (Original) The method of claim 28, further comprising:

(i) monitoring control data flow of an application to determine the port number of a new data flow by an application; and

(j) generating a new processing rule using the determined port number.

33. (Original) The method of claim 27, further comprising:

(k) providing a plurality of processor groups, with each processor group containing a plurality of processors; and

(l) assigning each of said packets to one of said plurality of processor groups, wherein one of said plurality of processors in said assigned groups processes the assigned packets.

34. (Original) The method of claim 33, wherein all packets related to a subscriber are assigned to a single processor group.

35. (Original) The method of claim 34, further comprising assigning packets to individual processors in a round-robin fashion.

36.-89. (Cancelled).

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90. (Previously Presented) An internet service node (ISN) providing a desired set of service policies to each of a plurality of subscribers, said ISN comprising:

identifying means for identifying a plurality of processing rules which provide a set of service policies desired by each subscriber;

configuration means for configuring an internet service node with said processing rules corresponding to each of said subscribers, said internet service node is provided as an edge device of an access network so said service policies can be controlled from an edge of said access network;

receiving means for receiving data in said internet service node;

determination means for determining in said internet service node a specific subscriber of the plurality of subscribers related to said received data; and

applying means for applying in said internet service node said plurality of processing rules related to said determine specific subscriber after said specific subscriber is determined.

91. (Previously Presented) The ISN of claim 90, wherein said ISN comprises a plurality of processors, said determination means and applying means together comprise:

assignment means for assigning each of said subscribers to a processor group, wherein each processor group is configured with the processing rules corresponding to the assigned subscribers; and

forwarding means for forwarding data related to each subscriber to a corresponding processor group after said determining of specific subscriber.

92. (Original) The ISN of claim 91, wherein end systems of said plurality of subscribers generate data using internet protocol (IP).

93. (Original) The ISN of claim 92, wherein said data comprises ATM cells.

94. (Original) The ISN of claim 93, wherein said assignment means comprises examination means for examining data contained in said ATM cells, said determination of specific subscriber being based on the results of said examination and a port on which said ATM cells are received, wherein said port is contained in said internet service node.

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95. (Original) The ISN of claim 94, wherein said assignment means further comprises modifying means for modifying the header of said cells to indicate said determined processor group such that the cells can be forwarded to an appropriate processor group based on examination of cell header, wherein said appropriate processor group is configured with the processing rules related to said specific subscriber.

96.-99. (Cancelled).

100. (Previously Presented) A method comprising:

specifying a service policy for a subscriber;

translating the service policy into processing rules, each of the processing rules including a classifier and an action, the classifier identifying a data flow, and the action implementing a policing service policy, the classifier including a time field to specify a time of day during which the policing service policy should be applied; and

processing incoming data in accordance with the processing rules.

101. (Previously Presented) The method of claim 100, wherein translating the service policy into processing rules comprises specifying a prioritization policy to prioritize available bandwidth as part of the policing service policy of each of the processing rules.

102. (Previously Presented) The method of claim 100, wherein translating the service policy into processing rules comprises specifying an allocation policy to allocate available bandwidth as part of the policing service policy of each of the processing rules.